

ABSTRACT OF THE DISCLOSURE

Embodiments of the invention provide a method for plating copper into features formed on a semiconductor substrate. The method includes positioning the substrate in a plating cell, wherein the plating cell includes a catholyte volume containing a catholyte solution, an anolyte volume containing an anolyte solution, an ionic membrane positioned to separate the anolyte volume from the catholyte volume, and an anode positioned in the anolyte volume. The method further includes applying a plating bias between the anode and the substrate, plating copper ions onto the substrate from the catholyte solution, and replenishing the copper ions plated onto the substrate from the catholyte solution with copper ions transported from the anolyte solution via the ionic membrane, wherein the catholyte solution has a copper concentration of greater than about 51 g/L.